

KRUEGER ENTERPRISES, INC.

GEOCHRON LABORATORIES DIVISION

24 BLACKSTONE STREET • CAMBRIDGE, MA. 02139 • (617)-876-3691

RADIOCARBON AGE DETERMINATION

REPORT OF ANALYTICAL WORK

Our Sample No. GX- 10233

Date Received: 03-23-84

Your Reference:

Date Reported: 04-02-84

Submitted by: Law Engineering Testing Co.
2749 Delk Road, S.E.
Marietta, GA 30067

Sample Name: MW6. Ponce Waste Facility, Puerto Rico. (EPA ID # PRD 980594709).
Job # GS3223, Work Order #11693.

AGE = (21.6 +/- 1.1)% of the modern standard activity.
(2.92 +/- 0.14) dpm/g Carbon.

Description: Barium carbonate precipitated from water.

Pretreatment: The barium salt precipitate was rapidly vacuum filtered and immediately hydrolyzed, under vacuum, to recover carbon dioxide from the barium carbonates for the analysis. C-13 analysis was made on a small portion of the same evolved gas.

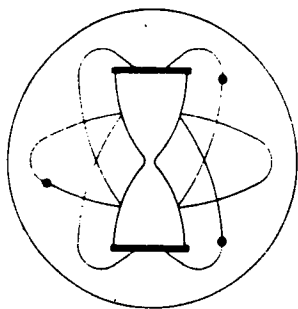
Comment:

Raw "age" is 12330 +/- 390 C-14 years B.P.

$\delta C_{PDB}^{13} = -5.9 \text{ ‰}$

Notes: This date is based upon the Libby half life (5570 years) for C¹⁴. The error stated is $\pm 1 \sigma$ as judged by the analytical data alone. Our modern standard is 95% of the activity of N.B.S. Oxalic Acid.

The age is referenced to the year A.D. 1950.



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RADIOCARBON AGE DETERMINATION

REPORT OF ANALYTICAL WORK

Our Sample No. GX- 10234

Date Received: 03-23-84

Your Reference:

Date Reported: 04-02-84

Submitted by: Law Engineering Testing Co.
2749 Delk Road, S.E.
Marietta, GA 30067

Sample Name: MW7. Ponce Waste Facility, Puerto Rico. (EPA ID # PRD 980594709).
Job # GS3223, Work Order #11693.

AGE = (11.6 +/- 1.0)% of the modern standard activity.
(1.58 +/- 0.13) dpm/g Carbon.

Description: Barium carbonate precipitated from water.

Pretreatment: The barium salt precipitate was rapidly vacuum filtered and immediately hydrolyzed, under vacuum, to recover carbon dioxide from the barium carbonates for the analysis. C-13 analysis was made on a small portion of the same evolved gas.

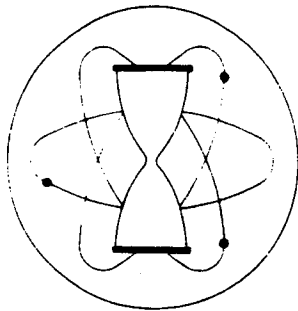
Comment:

Raw "age" is 17280 +/- 680 C-14 years B.P.

$\delta C_{PDB}^{13} = -5.7 \text{ ‰}$

Notes: This date is based upon the Libby half life (5570 years) for C¹⁴. The error stated is $\pm 1 \sigma$ as judged by the analytical data alone. Our modern standard is 95% of the activity of N.B.S. Oxalic Acid.

The age is referenced to the year A.D. 1950.



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RADIOCARBON AGE DETERMINATION

REPORT OF ANALYTICAL WORK

Our Sample No. GX- 10235

Date Received: 03-23-84

Your Reference:

Date Reported: 04-02-84

Submitted by: Law Engineering Testing Co.
2749 Delk Road, S.E.
Marietta, GA 30067

Sample Name: MW8. Ponce Waste Facility, Puerto Rico. (EPA ID # PRD 980594709).
Job # GS3223, Work Order #11693.

AGE = Sample too small for C-14 analysis.
Analysed for C-13, see below.

Description: Barium carbonate precipitated from water.

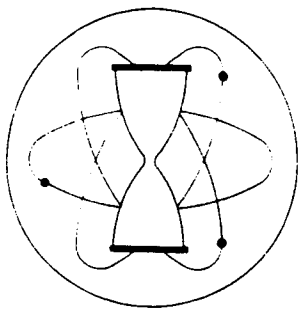
Pretreatment: The barium salt precipitate was rapidly vacuum filtered and immediately hydrolyzed, under vacuum, to recover carbon dioxide from the barium carbonates for the analysis. C-13 analysis was made on a small portion of the same evolved gas.

Comment:

$\delta C_{PDB}^{13} = -12.0 \text{ } \text{‰}$

Notes: This date is based upon the Libby half life (5570 years) for C^{14} . The error stated is $\pm 1 \sigma$ as judged by the analytical data alone. Our modern standard is 95% of the activity of N.B.S. Oxalic Acid.

The age is referenced to the year A.D. 1950.



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RADIOCARBON AGE DETERMINATION

REPORT OF ANALYTICAL WORK

Our Sample No. GX- 10236

Date Received: 03-23-84

Your Reference:

Date Reported: 04-02-84

Submitted by: Law Engineering Testing Co.
2749 Delk Road, S.E.
Marietta, GA 30067

Sample Name: Drill Water. Ponce Waste Facility, PR. (EPA ID # PRD 980594709).
Job # GS3223, Work Order #11693.

AGE = (119.1 +/- 2.3)% of the modern standard activity.
(16.15 +/- 0.32) dpm/g Carbon.

Description: Barium carbonate precipitated from water.

Pretreatment: The barium salt precipitate was rapidly vacuum filtered and immediately hydrolyzed, under vacuum, to recover carbon dioxide from the barium carbonates for the analysis. C-13 analysis was made on a small portion of the same evolved gas.

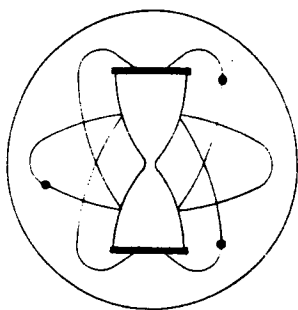
Comment:

Raw "age" is modern, present day.

$\delta C_{PDB}^{13} = -9.5 \text{ ‰}$

Notes: This date is based upon the Libby half life (5570 years) for C^{14} . The error stated is $\pm 1 \sigma$ as judged by the analytical data alone. Our modern standard is 95% of the activity of N.B.S. Oxalic Acid.

The age is referenced to the year A.D. 1950.



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RADIOCARBON AGE DETERMINATION

REPORT OF ANALYTICAL WORK

Our Sample No. GX- 10241

Date Received: 03-23-84

Your Reference:

Date Reported: 04-09-84

Submitted by: Law Engineering Testing Co.
2749 Delk Road, S.E.
Marietta, GA 30067

Sample Name: MW8. Ponce Waste Facility, Puerto Rico. (EPA ID # PRD 980594709).
Job # GS3223, Work Order #11693. Replacement for GX-10235.

AGE = (13.0 \pm 1.0)% of the modern standard activity.
(1.76 \pm 0.13) dpm/g Carbon.

Description: Barium carbonate precipitated from water.

Pretreatment: The barium salt precipitate was rapidly vacuum filtered and immediately hydrolyzed, under vacuum, to recover carbon dioxide from the barium carbonates for the analysis. C-13 analysis was made on a small portion of the same evolved gas.

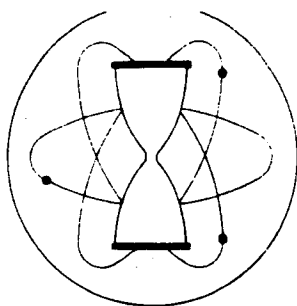
Comment:

Raw "age" is 16,390 \pm 610 C-14 years B.P.

$\delta C_{PDB}^{13} = -4.6$ ‰.

Notes: This date is based upon the Libby half life (5570 years) for C¹⁴. The error stated is $\pm 1 \sigma$ as judged by the analytical data alone. Our modern standard is 95% of the activity of N.B.S. Oxalic Acid.

The age is referenced to the year A.D. 1950.



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24 BLACKSTONE STREET • CAMBRIDGE, MA. 02139 • (617) - 876 - 3691

STABLE ISOTOPE RATIO ANALYSES

REPORT OF ANALYTICAL WORK

Submitted by:

Law Engineering Testing Co.
2749 Delk Road, S.E.
Marietta, GA 30067

Date Received: 3/23/84

Date Reported: 4/2/84

Your Reference: Job #GS3223
Work Order #11693
Ponce Waste Facility (EPA ID #PRD 980594709)

Our Lab. Number	Your Sample Number	Description	Analysis*
			δC^{13}
HSCOR-29008	Monitoring Well #2	Carbonate	- 9.0
HSCOR-29009	" "	#3	"
HSCOR-29010	" "	#4	"
HSCOR-29011	" "	#6	"
HSCOR-29012	" "	#7	"
HSCOR-29013	" "	#8	"
HSCOR-29014	Drilling Water	"	"
			- 9.5

* very low carbonate content

*Unless otherwise noted, all analyses are reported in ‰ notation and are computed as follows:

$$\delta R_{\text{sample}} \text{‰} = \left[\frac{R_{\text{sample}}}{R_{\text{standard}}} - 1 \right] \times 1000$$

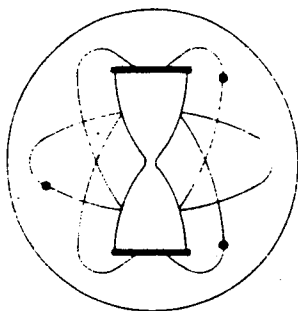
Where:

D/H standard is SMOW
 C^{13}/C^{12} standard is PDB
 O^{18}/O^{16} standard is SMOW
 S^{34}/S^{32} standard is Cañon Diablo troilite

And:

$R_{\text{standard}} = 0.000316^{**}$
 $R_{\text{standard}} = 0.011237$
 $R_{\text{standard}} = 0.0039948^{**}$
 $R_{\text{standard}} = 0.0450045$

**Double atom ratio



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STABLE ISOTOPE RATIO ANALYSES

REPORT OF ANALYTICAL WORK

Submitted by:
Law Engineering Testing Co.
2749 Delk Road
Marietta, GA 30067

Date Received: 3/23/84

Date Reported: 4/10/84

Your Reference: Job #GS3223

Work Order #11693

Ponce Waste Facility (EPA ID #PRD 980594709)

Our Lab. Number	Your Sample Number	Description	Analysis*
			δC^{13}
SHOR-29015	S-1	Carbonate from Surface Water	- 9.0
SHOR-29016	S-2	" "	-13.7
SHOR-29017	S-3	" "	-12.0
SHOR-29018	S-4	" "	-12.2
SHOR-29019	S-5	" "	- 8.2
SHOR-29020	S-6	" "	-11.3

*Unless otherwise noted, all analyses are reported in ‰ notation and are computed as follows:

$$\delta R_{\text{sample}}\text{‰} = \left[\frac{R_{\text{sample}}}{R_{\text{standard}}} - 1 \right] \times 1000$$

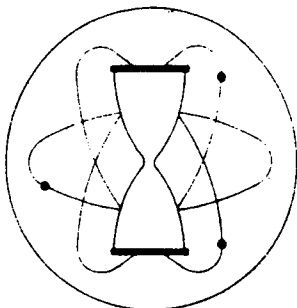
Where:

D/H standard is SMOW
 C^{13}/C^{12} standard is PDB
 O^{18}/O^{16} standard is SMOW
 S^{34}/S^{32} standard is Cañon Diablo troilite

And:

$R_{\text{standard}} = 0.000316^{**}$
 $R_{\text{standard}} = 0.011237$
 $R_{\text{standard}} = 0.0039948^{**}$
 $R_{\text{standard}} = 0.0450045$

**Double standard



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STABLE ISOTOPE RATIO ANALYSES

REPORT OF ANALYTICAL WORK

Submitted by:

Law Engineering Testing Co.
2749 Delk Road, S.E.
Marietta, GA 30067

Date Received: 3/23/84

Date Reported: 4/2/84

Your Reference: Job #GS3223
Work Order #11693

Ponce Waste Facility (EPA ID #PRD 980594709)

Our Lab. Number	Your Sample Number	Description	Analysis*	
			δC^{13}	δO^{18}
COR-29021	Well MW-4	Rock Chip	-0.1	+30.0
COR-29022	" "	" "	-0.2	+29.6
COR-29023	Well MW-8	" "	-0.5	+29.4
COR-29024	" "	" "	+0.3	+29.5

Two different chip samples were collected in place from outcrops near the collar of each well.

* Unless otherwise noted, all analyses are reported in ‰ notation and are computed as follows:

$$\delta R_{\text{sample}} \text{‰} = \left[\frac{R_{\text{sample}}}{R_{\text{standard}}} - 1 \right] \times 1000$$

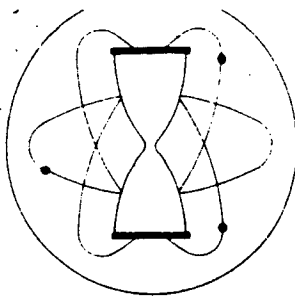
Where:

D/H standard is SMOW
 C^{13}/C^{12} standard is PDB
 O^{18}/O^{16} standard is SMOW
 S^{34}/S^{32} standard is Cañon Diablo troilite

And:

$R_{\text{standard}} = 0.000316^{**}$
 $R_{\text{standard}} = 0.011237$
 $R_{\text{standard}} = 0.0039948^{**}$
 $R_{\text{standard}} = 0.0450045$

** Double atom ratio



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STABLE ISOTOPE RATIO ANALYSES

REPORT OF ANALYTICAL WORK

Submitted by:

Law Engineering Testing Co.
2749 Delk Road
Marietta, GA 30067

Date Received: 4/4/84

Date Reported: 4/10/84

Your Reference Job #GS3223

Work Order #11693

(Ponce Waste Facility (EPA ID #PRD 980594709))

Our Lab. Number	Your Sample Number	Description	Analysis*
			δC^{13}
HSCOR-29246		Monitoring Well #8 Water Resampled	-4.6

*Unless otherwise noted, all analyses are reported in ‰ notation and are computed as follows:

$$\delta R_{\text{sample}}\text{‰} = \left[\frac{R_{\text{sample}}}{R_{\text{standard}}} - 1 \right] \times 1000$$

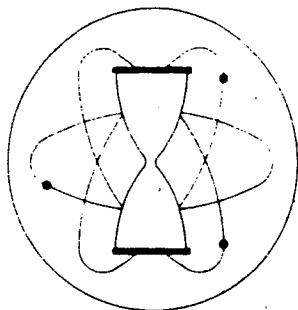
Where:

D/H standard is SMOW
 C^{13}/C^{12} standard is PDB
 O^{18}/O^{16} standard is SMOW
 S^{34}/S^{32} standard is Cañon Diablo troilite

And:

$R_{\text{standard}} = 0.000316^{**}$
 $R_{\text{standard}} = 0.011237$
 $R_{\text{standard}} = 0.0039948^{**}$
 $R_{\text{standard}} = 0.0450045$

**Double atom ratio



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STABLE ISOTOPE RATIO ANALYSES

REPORT OF ANALYTICAL WORK

Submitted by:
Law Engineering Testing Co.
2749 Delk Road, S.E.
Marietta, GA 30067

Date Received: 3/23/84

Date Reported: 4/2/84

Your Reference: Job #GS3223

Work Order #11693

Ponce Waste Facility (EPA ID #PRD 980594709)

Our Lab. Number	Your Sample Number	Description	Analysis*	
			δD	δO^{18}
HSCOR-29008	Monitoring Well #2	Water	-22	-3.8
HSCOR-29009	" "	#3 "	-19	-2.8
HSCOR-29010	" "	#4 "	-20	-3.0
HSCOR-29011	" "	#6 "	-16	-2.9
HSCOR-29012	" "	#7 "	-13	-2.2
HSCOR-29013	" "	#8 "	-12	-2.2
HSCOR-29014	Drilling Water		- 5	-1.7

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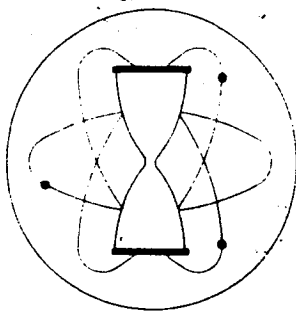
$$\delta R_{\text{sample}}\text{‰} = \left[\frac{R_{\text{sample}}}{R_{\text{standard}}} - 1 \right] \times 1000$$

Where:

D/H standard is SMOW
 C^{13}/C^{12} standard is PDB
 O^{18}/O^{16} standard is SMOW
 S^{34}/S^{32} standard is Cañon Diablo troilite

And:

$R_{\text{standard}} = 0.000316^{**}$
 $R_{\text{standard}} = 0.011237$
 $R_{\text{standard}} = 0.0039948^{**}$
 $R_{\text{standard}} = 0.0450045$



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REPORT OF ANALYTICAL WORK

Submitted by:

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2749 Delk Road, S.E.
Marietta, GA 30067

Date Received: 3/23/84

Date Reported: 4/10/84

Your Reference: Job #GS3223

Work Order #11693

Ponce Waste Facility (EPA ID #PRD 980594709)

Our Lab. Number	Your Sample Number	Description	Analysis*	
			δD	δO^{18}
SHOR-29015	S-1	Surface Water	- 9	-1.8
SHOR-29016	S-2	" "	-13	-2.3
SHOR-29017	S-3	" "	-13	-2.0
SHOR-29018	S-4	" "	-14	-1.7
SHOR-29019	S-5	" "	-14	-1.8
SHOR-29020	S-6	" "	-12	-1.8

*Unless otherwise noted, all analyses are reported in ‰ notation and are computed as follows:

$$\delta R_{\text{sample}} \text{‰} = \left[\frac{R_{\text{sample}}}{R_{\text{standard}}} - 1 \right] \times 1000$$

Where:

D/H standard is SMOW
 C^{13}/C^{12} standard is PDB
 O^{18}/O^{16} standard is SMOW
 S^{34}/S^{32} standard is Cañon Diablo troilite

And:

$R_{\text{standard}} = 0.000316^{**}$
 $R_{\text{standard}} = 0.011237$
 $R_{\text{standard}} = 0.0039948^{**}$
 $R_{\text{standard}} = 0.0450045$

**Double atom ratio